Application Number 10/538634
Response to the Office Action dated September 19, 2008

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently Amended) A toner comprising an additive and a toner matrix that comprises a binder resin, a colorant, and a wax,

wherein the additive contains an inorganic micropowder whose surface is ~~treated~~ coated with polysiloxane and at least one selected from fatty acids and derivatives thereof and,

wherein the at least one selected from fatty acids and derivatives thereof is at least one selected from the following groups (1), (2), (3) and (4):

(1) a group of fatty acids consisting of caprylic acid, capric acid, undecylic acid, lauric acid, myristic acid, palmitic acid, stearic acid, behenic acid, montanic acid, lacceric acid, oleic acid, erucic acid, sorbic acid, and linoleic acid;

(2) a group of fatty acid esters consisting of a fatty acid pentaerythritol monoester, a fatty acid pentaerythritol triester, and a fatty acid trimethylol propane ester;

(3) a group of aliphatic amides consisting of palmitic acid amide, palmitoleic acid amide, stearic acid amide, oleic acid amide, arachidic acid amide, eicosenoic acid amide, behenic acid amide, erucic acid amide, and lignoceric acid amide; and

(4) a group of fatty acid metal salts consisting of salts of at least one fatty acid selected from the group consisting of caprylic acid, capric acid, undecylic acid, lauric acid, myristic acid, palmitic acid, stearic acid, behenic acid, montanic acid, lacceric acid, oleic acid, erucic acid, sorbic acid, and linoleic acid with at least one metal selected from the group consisting of aluminum, zinc, calcium, magnesium, lithium, sodium, lead, and barium.

2. (Cancelled)

3. (Original) The toner according to claim 1,

wherein an average particle size of the inorganic micropowder is in a range of 30 nm to 200 nm.

4. (Original) The toner according to claim 1,

wherein the additive further contains a negatively-chargeable silica micropowder whose average particle size is in a range of 6 nm to 30 nm.

5. (Previously Presented) The toner according to claim 1,

wherein a mixing ratio between (A) the at least one selected from fatty acids and derivatives thereof and (B) the polysiloxane is A:B=2:1 to 1:20.

6. (Original) The toner according to claim 1,

wherein the polysiloxane is at least one selected from dimethylpolysiloxane, diphenyl polysiloxane, methylphenyl polysiloxane, phenyl hydrogen polysiloxane, methyl hydrogen polysiloxane, and phenyl hydrogen methyl hydrogen polysiloxane.

7. (Currently Amended) The toner according to claim 1,

wherein with respect to the inorganic micropowder whose surface is ~~treated~~ coated with polysiloxane and the at least one selected from fatty acids and derivatives thereof, an ignition loss is 5 to 25 wt%, when the inorganic micropowder is ignited at 500°C for 2 hours.

8. (Currently Amended) The toner according to claim 1,

wherein the wax is an ester-based wax with an endothermic peak temperature (as found by DSC) of 50 to 120°C, an iodine value of 25 or less, a saponification value of 30 to 300, a number average molecular weight (as determined by gel permeation chromatography (GPC)) of 100 to 5000, a weight average molecular weight of 200 to 10,000, a ratio of the weight average molecular weight to the number average molecular

weight (weight average molecular weight/number average molecular weight) of 1.01 to 8, and a ratio of Z average molecular weight to the number average molecular weight (Z average molecular weight/number average molecular weight) of 1.02 to 10, and having at least one molecular weight maximum peak in a molecular weight region from 5 × [[102]] 10^2 to 1 × [[104]] 10^4.

9. (Currently Amended) The toner according to claim 1,

wherein the wax is obtained by reacting a [[[C4]] C_4 to [[C30]] C_{30} long chain alkyl alcohol, an unsaturated polycarboxylic acid or anhydride thereof, and a hydrocarbon wax, has a molecular weight distribution (as determined by GPC) such that a weight average molecular weight is from 1000 to 6000, a Z average molecular weight is from 1500 to 9000, a ratio of the weight average molecular weight to number average molecular weight (weight average molecular weight/number average molecular weight) is from 1.1 to 3.8, a ratio of the Z average molecular weight to the number average molecular weight (Z average molecular weight/number average molecular weight) is from 1.5 to 6.5, and there is at least one molecular weight maximum peak in a region from 1 × [[103]]] 10^3 to 3 × [[104]] 10^4, and the presence of an endothermic peak temperature (as found by DSC) of from 80°C to 120°C, and an acid value of from 5 to 80 mgKOH/g.

10. (Original) The toner according to claim 1,

wherein the wax is at least one wax selected from a wax based on an aliphatic amide having at least 16 to 24 carbon atoms, and a wax based on an alkylenebis fatty acid amide of a saturated or a mono- or diunsaturated fatty acid.

11. (Previously Presented) The toner according to claim 1,

wherein the wax is at least one wax selected from the group consisting of hydroxystearic acid derivatives, glycerol fatty acid esters, glycol fatty acid esters, and sorbitan fatty acid esters.

12. (Currently Amended) A two-component developer comprising,

a toner comprising an additive and a toner matrix that comprises at least a binder resin, a colorant, and a wax, and a carrier,

wherein the additive contains an inorganic micropowder whose surface is ~~treated~~ coated with polysiloxane and at least one selected from fatty acids and derivatives thereof,

the at least one selected from fatty acids and derivatives thereof being at least one selected from the following groups (1), (2), (3) and (4):

(1) a group of fatty acids consisting of caprylic acid, capric acid, undecylic acid, lauric acid, myristic acid, palmitic acid, stearic acid, behenic acid, montanic acid, lacceric acid, oleic acid, erucic acid, sorbic acid, and linoleic acid;

(2) a group of fatty acid esters consisting of a fatty acid pentaerythritol monoester, a fatty acid pentaerythritol triester, and a fatty acid trimethylol propane ester;

(3) a group of aliphatic amides consisting of palmitic acid amide, palmitoleic acid amide, stearic acid amide, oleic acid amide, arachidic acid amide, eicosenoic acid amide, behenic acid amide, erucic acid amide, and lignoceric acid amid; and

(4) a group of fatty acid metal salts consisting of salts of at least one fatty acid selected from the group consisting of caprylic acid, capric acid, undecylic acid, lauric acid, myristic acid, palmitic acid, stearic acid, behenic acid, montanic acid, lacceric acid, oleic acid, erucic acid, sorbic acid, and linoleic acid with at least one metal selected from the group consisting of aluminum, zinc, calcium, magnesium, lithium, sodium, lead, and barium; and

wherein the carrier comprises a core material whose surface is coated with a resin containing a fluorine-modified silicone resin containing an aminosilane coupling agent.

13. (Cancelled)

14. (Original) The two-component developer according to claim 12,

wherein an average particle size of the inorganic micropowder is in a range of 30 nm to 200 nm.

15. (Original) The two-component developer according to claim 12,

wherein the additive further contains a negatively-chargeable silica micropowder whose average particle size is in a range of 6 nm to 30 nm.

16. (Previously Presented) The two-component developer according to claim 12,

wherein a mixing ratio between (A) the at least one selected from fatty acids and derivatives thereof and (B) the polysiloxane is A:B=2:1 to 1:20.

17. (Original) The two-component developer according to claim 12,

wherein the polysiloxane is at least one selected from dimethylpolysiloxane, diphenyl polysiloxane, methylphenyl polysiloxane, phenyl hydrogen polysiloxane, methyl hydrogen polysiloxane, and phenyl hydrogen methyl hydrogen polysiloxane.

18. (Currently Amended) The two-component developer according to claim 12,

wherein with respect to the inorganic micropowder whose surface is ~~treated~~ coated with polysiloxane and the at least one selected from fatty acids and derivatives thereof, an ignition loss is 5 to 25 wt%, when the inorganic micropowder is ignited at 500°C for 2 hours.

19. (Currently Amended) The two-component developer according to claim 12,

wherein the wax is an ester-based wax with an endothermic peak temperature (as found by DSC) of 50 to 120°C, an iodine value of 25 or less, a saponification value of 30 to 300, a number average molecular weight (as determined by gel permeation chromatography (GPC)) of 100 to 5000, a weight average molecular weight of 200 to 10,000, a ratio of the weight average molecular weight to the number average molecular weight (weight average molecular weight/number average molecular weight) of 1.01 to 8, and a ratio of Z average molecular weight to the number average molecular weight (Z average molecular weight/number average molecular weight) of 1.02 to 10, and the

presence of at least one molecular weight maximum peak in a molecular weight region from 5 × [[102]] 10^2 to 1 × [[104]] 10^4.

20. (Currently Amended) The two-component developer according to claim 12, wherein the wax is obtained by reacting a [[C4]] C_4 to [[C30]] C_{30} long chain alkyl alcohol, an unsaturated polycarboxylic acid or anhydride thereof, and a hydrocarbon wax, has a molecular weight distribution (as determined by GPC) such that a weight average molecular weight is from 1000 to 6000, a Z average molecular weight is from 1500 to 9000, a ratio of the weight average molecular weight to number average molecular weight (weight average molecular weight/number average molecular weight) is from 1.1 to 3.8, a ratio of the Z average molecular weight to the number average molecular weight (Z average molecular weight/number average molecular weight) is from 1.5 to 6.5, and the presence of at least one molecular weight maximum peak in a region from 1 × [[103]] 10^3 to 3 × [[104]] 10^4, and has an endothermic peak temperature (as found by DSC) of from 80°C to 120°C, and an acid value of from 5 to 80 mgKOH/g.

21. (Original) The two-component developer according to claim 12, wherein the wax is at least one wax selected from a wax based on an aliphatic amide having at least 16 to 24 carbon atoms, and a wax based on an alkylenebis fatty acid amide of a saturated or a mono- or diunsaturated fatty acid.

22. (Previously Presented) The two-component developer according to claim 12, wherein the wax is at least one wax selected from the group consisting of hydroxystearic acid derivatives, glycerol fatty acid esters, glycol fatty acid esters, and sorbitan fatty acid esters.

23. (Original) The two-component developer according to claim 12, wherein the coating resin of the carrier contains the aminosilane coupling agent in a proportion of 5 to 40 parts by weight per 100 parts by weight of the coating resin.

24. (Original) The two-component developer according to claim 12,

wherein the coating resin of the carrier contains a conductive micropowder in a proportion of 1 to 15 parts by weight per 100 parts by weight of the coating resin.

25-27. (Cancelled)

28. (New) The toner according to claim 1, wherein the inorganic micropowder whose surface is coated is obtained by the step of:

mixing an inorganic micropowder with a solution of the polysiloxane and at least one selected from fatty acids and derivatives thereof dissolved in an organic solvent and then

drying the obtained product.

29. (New) The toner according to claim 1, wherein the inorganic micropowder whose surface is coated is obtained by the steps of:

mixing an inorganic micropowder with a solution of polysiloxane dissolved in an organic solvent,

mixing the polysiloxane-treated inorganic micropowder with a solution of at least one selected from fatty acids and derivatives thereof dissolved in an organic solvent, and then

drying the obtained product.

30. (New) The toner according to claim 1, wherein the inorganic micropowder whose surface is coated is obtained by the steps of:

mixing an inorganic micropowder with a solution of at least one of a coupling agent, polysiloxane, and a mixture thereof dissolved in an organic solvent,

mixing the at least one of the coupling agent-, the polysiloxane-, or the mixture thereof -treated inorganic micropowder with a solution of the polysiloxane and at least one selected from fatty acids and derivatives thereof in an organic solvent, and then

drying the obtained product.

31. (New) The two-component developer according to claim 12, wherein the inorganic micropowder whose surface is coated is obtained by the step of:

mixing an inorganic micropowder with a solution of the polysiloxane and at least one selected from fatty acids and derivatives thereof dissolved in an organic solvent and then

drying the obtained product.

32. (New) The two-component developer according to claim 12, wherein the inorganic micropowder whose surface is coated is obtained by the steps of:

mixing an inorganic micropowder with a solution of polysiloxane dissolved in an organic solvent,

mixing the polysiloxane-treated inorganic micropowder with a solution of at least one selected from fatty acids and derivatives thereof dissolved in an organic solvent, and then

drying the obtained product.

33. (New) The two-component developer according to claim 12, wherein the inorganic micropowder whose surface is coated is obtained by the steps of:

mixing an inorganic micropowder with a solution of at least one of a coupling agent, polysiloxane, or a mixture thereof dissolved in an organic solvent,

mixing the at least one of the coupling agent-, the polysiloxane-, or the mixture thereof-treated inorganic micropowder with a solution of the polysiloxane and the at least one selected from fatty acids and derivatives thereof in an organic solvent, and then

drying the obtained product.